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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/667,393	09/23/2003	Takeshi Yoneda	032405R157	9373
441	7590	08/22/2007		
SMITH, GAMBRELL & RUSSELL 1850 M STREET, N.W., SUITE 800 WASHINGTON, DC 20036			EXAMINER WEISKOPF, MARIE	
			ART UNIT	PAPER NUMBER
			3661	
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			08/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<p align="center">Office Action Summary</p>	Application No. 10/667,393	Applicant(s) YONEDA ET AL.	
	Examiner Marie A. Weiskopf	Art Unit 3661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) 3,4,7-16,19,20,23-32,35,38 and 40-44 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 17,18,21,22,36 and 37 is/are allowed.
- 6) ☒ Claim(s) 1,5 and 39 is/are rejected.
- 7) ☒ Claim(s) 2,6 and 34 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 June 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's election without traverse of Species 1 and claim group 5-6, 21-22 in the reply filed on 06/05/07 is acknowledged.

Claim Objections

2. Claim 1 is objected to because of the following informalities: line 3 states "an clutch unit" which is grammatically incorrect. Examiner suggests changing to "a clutch unit". Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 5, 33 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al (US 5,090,510) in view of Slicker (US 5,439,428)

- In regard to claim 1 and 33, Watanabe et al discloses a differential limiting control apparatus and method for a vehicle comprising:
 - A clutch unit interposed between one rotational shaft and the other rotational shaft for variably transmitting a driving force between the one rotational shaft and the other rotational shaft (Column 3, lines 25-30)
 - A target differential speed setting unit for setting a target differential speed between the one rotational shaft and the other rotational shaft. (Column 3, lines 31-39)

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- An actual differential speed detecting unit for detecting an actual differential speed between the one rotational shaft and the other rotational shaft (Column 3, lines 38-39)
- A clutch torque computing unit for computing an engagement force of the clutch unit by obtaining a deviation between the target differential speed and the actual differential speed. (Column 3, lines 40-67)

Watanabe et al fails to specifically disclose configuring a switching function by using at least a polarity related to an integral term of the deviation and applying a sliding mode control. Slicker discloses a method and apparatus for robust automatic clutch control with PID regulation. Slicker discloses configuring a switching function by using at least a polarity related to an integral term of the deviation and applying a sliding mode control. (Column 7, lines 35-33) It would have been obvious to one having ordinary skill in the art at the time of the invention to apply the method and apparatus of Slicker to that taught by Watanabe et al in order to provide a system with a better response for the clutch torque computing unit.

- In regard to claims 5 and 39, Watanabe et al discloses:
 - The clutch unit is interposed between a front and rear axles (Column 3, lines 25-30)
 - The target differential speed setting unit sets a target differential speed at least either one of between the front and rear axles, a left front wheel and

a right front wheel, or a left rear wheel and a right rear wheel (Column 3, lines 25-67)

- o The actual differential speed detecting unit detects an actual differential speed at least either one of between the front and rear axles, a left front wheel and a right front wheel, or a left rear wheel and a right rear wheel (Column 3, lines 25-67)
- o The clutch torque computing unit computes an engagement force of the clutch unit using a deviation between a target differential speed set at the target differential speed setting unit and an actual differential speed detected at the actual differential speed detecting unit. (Column 3, lines 25-67)

Allowable Subject Matter

5. Claims 17-18, 21-22 and 36-37 are allowed.
6. The following is a statement of reasons for the indication of allowable subject matter: the prior art, individually or in combination, fails to disclose, teach or suggest in regard to claims 17 and 36, a clutch torque computing unit for computing an engagement force of the clutch unit by configuring a switching function having a term where a value of a polarity computed using an integral term based on at least a deviation between the target differential speed and the actual differential speed is multiplied by a predetermined gain and using a sliding mode control where when the switching function takes a positing value, the value of the switching function is used as a control value. Claims 18, 21-22 and 37 further define the invention.

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7. Claims 2, 6, and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter: the prior art, individually or in combination, fails to disclose, teach or suggest wherein the switching function configured at the clutch torque computing unit is such as to result from adding a value obtained by multiplying a differential term of the deviation between the target differential speed and the actual differential speed by a predetermined gain to a value obtained by multiplying a value of the polarity by a predetermined gain.

Conclusion

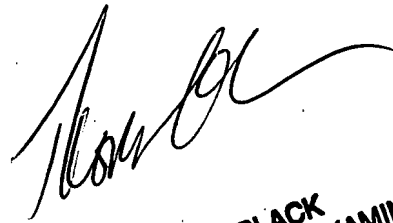
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marie A. Weiskopf whose telephone number is (571) 272-6288. The examiner can normally be reached on Monday-Thursday between 7:00 AM and 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Black can be reached on (571) 272-6956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MW



THOMAS BLACK
SUPERVISORY PATENT EXAMINER